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ABSTRACT

This paper has been designed as a general guide to the teacher, student, group, or club interested in identifying environmental or resource problems at the community level and helping to find solutions to them. The paper discusses the independent studies program as a method of studying environmental problems as well as a source of academic credit. The establishment of such a program and considerations involved in such a study are examined. Environmental problem solving and the complexity of environmental problems are also discussed. The paper presents three project types which may be used as guidelines for other independent studies. The first project involves identifying and lessening the impact of a community environmental problem and involves either study of the relationships between related concerns and establishing priorities or assessing the perceived problem through a number of interviews or questionnaires. The second project, Assessing Impact of a Developmental Project, involves using some of the guidelines established by the National Environmental Protection Agency in their impact statements. The third project, Environmental Research, requires a laboratory test facility. Suggested readings and a checklist of environmental concerns are included in the paper. (TK)

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ENVIRONMENTAL EDUCATION STUDY PROJECTS

FOR

HIGH SCHOOL STUDENTS

TENNESSEE VALLEY AUTHORITY

SE 018 495

Message to the Reader

This paper is being field tested in some high schools in the Tennessee Valley region. Any suggestions you might have concerning its content would be very helpful to us in making revisions and improvements. Please send your comments to the address shown below.

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July 1974

ENVIRONMENTAL EDUCATION STUDY PROJECTS FOR HIGH SCHOOL STUDENTS

Introduction and Purpose

Teachers and students across the Tennessee Valley region often ask: "What can we do to begin an environmental studies program with our existing resources?" This paper addresses this question and has been designed to serve as a general guide to the teacher, student, group, or club interested in identifying environmental or resource problems at the community level and helping to find solutions to them.

Developing the Independent Studies Program

Some schools now have independent studies programs where students receive academic credit for individual or group work outside the classroom in subject areas such as science, social studies, language arts, mathematics, photography, or health. (Since environmental education is multidisciplinary, participants frequently don't receive academic credit in environmental education per se.) Students from grades ten, eleven, and twelve enroll in the independent studies program, which is supervised by a teacher or advisor. Special guidelines have been prepared for students to follow during the course of their study.

If there is no independent studies program, there are a few things a student can do to help get one established. Ask your teacher if a program can be established in which you receive academic credit for individual work. Other questions you might ask, all of which should be answered in the school system's guidelines for students enrolling in the independent studies program, are: What guidelines or standards should you follow in designing the study and preparing the report? For example, should the report include an abstract, be written in the third person, typed, footnoted, documented with photographs, and include a bibliography? How many copies of the report must be turned in? How will your report be evaluated? Will you be required to give a presentation of your study to a group of teachers and students? What are the policies for researching your problem, utilizing the library and community resource people? The use of libraries and resource people from the many agencies and organizations concerned with specific problems will be a critical part of your project.

Before beginning your study, there are three items you should consider–complexity, time, and cost.

Complexity–Probably the most difficult thing for you will be identifying a problem and narrowing the study down in scope so all the constraints or drawbacks in completing it are known. You won't want to select a problem which is beyond your capabilities to deal with or for which there are inadequate resources–literature, supplies, or materials, etc.–available for use in your work. Doing so would only result in a frustrating experience and a waste of time.

Time–Prepare a schedule of the work you plan to do so it can be completed before the end of the term.

Cost–The three projects described in this paper will require very little money, if any. However, prepare a description of the equipment, supplies, material, etc., you will need and estimate the costs before deciding definitely on any given problem. Check with your teacher about the cost. There may be funds available for your study within the school system, or they may be obtained through a grant from a foundation.

(Printed on recycled paper)

Environmental Problem Solving

Problems with resource utilization and the environment are numerous. This is not a new phenomenon. As human populations and demand upon world resources increase, so do the number of problems or concerns. There are no simple solutions to most of these problems. They are very complex and implementing solutions to one problem often results in the creation of a multitude of other problems.

For example, if you try to stop air pollution by closing down an industry, you must recognize what would happen as a result of the loss of products and jobs. Therefore, it is very important that you study the relationships of one problem to another. Economic, social, and political implications should be considered when arriving at solutions. Let's consider economics. You might select the solution that goes farthest to solve the problem, but then find that funds are not available or that the cost is too great in relation to the benefits. In this case, you should consider priorities and alternate solutions.

Keep in mind that finding solutions to environmental problems begins with you—the individual. It will do very little good to point the finger at someone else until you have examined your own behavior and life style to determine how your own actions change the environment in desirable or undesirable ways.

The real result of this problem-solving approach is not the report you prepare, but the experience you gain by seeing for yourself what is involved in finding answers that recognize both environmental protection and other public needs. Already the widespread national environmental concern of a few years ago is being crowded out of the center of public attention by worries over inflation and unemployment. Many people begin to lose interest in environmental problems when they find that the answers are not simple—that (for example) deciding what to do about problems posed by offshore drilling or an Alaska pipeline also involves facing the complexities of obtaining an adequate national oil supply.

America is going to be facing these kinds of decisions not just in the next few years but throughout your lifetime. How wisely those decisions are made will determine our country's future quality of life. And you can make a positive contribution in determining how well they are made if you are willing to be an actively involved citizen and to devote time for studying and understanding these sometimes complex problems and issues. You can speak out on these issues and be heard—if you demonstrate that you have done your homework, have faced the issues with an open mind, and know what you are talking about.

Preparation of reports is required for carrying out the three projects described in this paper. In your search for data and information, be sure to contact personnel from the entities (1) causing the distinct problem, (2) opposing the problem, and (3) having a legal responsibility to deal with the problem.

Project No. 1—Identifying and Lessening the Impact of an Environmental Problem in Your Community

Discussion—In appendix A, you will find a questionnaire containing a comprehensive listing of environmental concerns. There are three methods for you to consider in using the information in the appendix.

> Method No. 1—This method is quite simple. Based on your knowledge about a particular concern in your community, select the category and element, or elements which you would like to learn more about. If you select "solid waste disposal" which is presented in the appendix under categories "Water Problems" and "Land Use," you will note that it is also related to other categories—e.g., Population, Resource Depletion, Aesthetics, Health Hazards, etc. Study the relationships between the categories and, in your report, address as many facets of the situation as time permits. In this method, you individually are deciding the priority area of concern.

Method No. 2–This method is a little more time-consuming and will require funds for materials–paper, reproduction, etc. It involves using the material in appendix A as a checklist and personally interviewing at least 50 people from different age groups and walks of life in your community to determine which concern is considered to be of highest priority to those interviewed. Their primary concern then becomes your problem for study. In addition to the personal interview, you could also use the telephone to obtain the desired information.

Method No. 3–This method will require more time than methods 1 and 2 and more cost for materials–paper, reproduction, postage, etc. It may be appropriate as a team project. It requires utilizing the material in the appendix to prepare a questionnaire which can be mailed to 100 to 500 people from different walks of life in your community. A possible problem with this method is that you could receive a poor return of questionnaires. It might be desirable to follow up with a telephone call to each respondent a few days after the questionnaire has been mailed to help ensure its completion and return. As in method 2, people in the community help you select the most important problem for your study.

The design of the study and actual format of your report–abstract, statement of the problem, etc.–should be determined with your advisor. Some important questions you should consider answering in the report are:

1. What is the nature or scope of the problem? (solid waste, energy, air pollution, transportation, etc.)

2. Why does the problem exist? (This could include such topics as: lack of legislation and enforcement, lack of understanding and concern, lack of a solution, etc.)

3. What is the existing status of the problem in your community, state, region, and nation? (For example, if you select solid waste disposal, what is the situation with littering, open dumps, sanitary landfills, recycling, etc.?)

4. Who (individuals including yourself and/or agencies) has the responsibility for offsetting the problem, and what is being done about it? (Include information on legislation, enforcement, funding of remedial programs at the local level, monitoring pollution, etc.)

5. What is the significant impact of the problem on the environment including the effects on plant and animal populations? (Include a discussion on the amount and type of land lost, transportation problems caused, changes in air and water quality and in wildlife habitat, noise, etc.)

6. What are the possible solutions to the problem? (Consider alternative solutions, compromises or tradeoffs, and an estimated cost for each solution.)

7. What can be done to help solve or minimize the problem? (Consider yourself as an individual or in a group–club, professional organization, etc.–attending hearings, voting, establishing and enforcing legislation, monitoring, etc.)

8. What will you do as an individual (or group) to help solve or minimize the problem? (REMEMBER–this is the constructive action part of your project and is, therefore, very important.)

Project No. 2–Assessing Impact of a Development Project

Discussion–On January 1, 1970, the President signed into law the National Environmental Policy Act (NEPA), which declared a national policy to encourage productive and enjoyable harmony between man and his environment.

NEPA authorized the establishment of a Council on Environmental Quality (CEQ) in

the Executive Office of the President. CEQ is charged with responsibility to study the condition of the Nation's environment, to develop new environmental programs and policies, to coordinate the wide array of Federal environmental efforts, to see that all Federal activities take environmental considerations into account, and to assist the President in assessing environmental problems and in determining ways to solve them.

To ensure that environmental amenities and values are given systematic consideration equal to economic and technical consideration in the Federal decision-making process, NEPA requires each Federal agency to prepare an environmental impact statement in advance of each major action, recommendation, or report on legislation that may significantly affect the quality of the human environment. Such actions may include new highway construction, harbor dredging or filling, nuclear power plant construction, large-scale aerial pesticide spraying, river channeling, new jet runways, munition disposal, bridge construction, waste treatment or disposal projects, and more.

This project requires the preparation of a written report. It has been designed to help you learn some of the things planners/developers should consider before implementing a project that could have adverse effects on the environment.

To begin, you must select a development project such as a shopping center, subdivision (housing development), dam, nuclear power plant, airport, industry, etc., in your community or state.

The design of the study and actual format of your report–abstract, statement of the problem (project title and description), etc.–should be determined with your advisor.

Any assessment will begin by examining what planning has been done for the project or proposal under study. For example:

1. What need will this project or activity serve? Has the responsible organization given careful study to this need? (A highway or sewage treatment plant would be built to serve a specific need, while an office building or a housing development might serve to help meet a more general demand for such facilities.)

2. What factors were considered in choosing this type of development, facility, or activity? Were other alternatives considered, and why were they rejected?

3. Why was this site selected? Were other possible locations considered?

In assessing how well this basic planning has been done, it is important to be realistic about the choice of alternatives. Usually it is easier to recognize the problems posed by the specific project you are studying than to foresee what faults or limitations might arise from a different approach or at a different location. Often people in the area affected by a proposed project simply want it built "some place else."

In other cases there may be new technological approaches that have drawn attention for their potential advantages, but are not yet sufficiently proven or not yet available at practical cost for the situation you are studying.

In determining a project's environmental impact, some of the questions you should consider answering in your report are:

1. Will there be a change in air quality during and/or after construction?

2. Will there be a change in water quality during and/or after construction?

3. Will the level of noise change during and after construction?

4. What changes will occur to recreation lands and wildlife habitat?

5. Will any mineral (coal, uranium, etc.) deposits be affected?

6. How will excess excavated materials be disposed of?

7. How will contaminants (radioactive wastes, chemicals, etc.) be stored and all wastes disposed of after construction?

8. Will there be any change in the water table as a result of the project?

9. How will the land structure be changed?

10. How will human, wildlife, and plant populations be affected?

11. Will there be any aesthetic (visual) deterioration as a result of the project or any odors?

12. Will any rare or endangered species be affected by the project?

13. How will education and health services be changed as a result of the project?

14. How will transportation in the project area be changed during and after construction?

15. Will any legislative changes need to be made—pollution standards or regulations, zoning, ordinances, etc.?

16. Will any historic features or unique wilderness areas be affected by the project?

17. What will be the number and types of new jobs available during and after construction?

18. What changes in population density will occur during and after construction?

19. What changes will occur to the overall economic status of the area?

20. How would the overall "quality of life" be changed as a result of the project? How do the benefits compare with the adverse effects?

Wherever one of these items does raise the possibility of a significant impact, try to determine whether the developer has considered the problem and has made an adequate effort to offset or minimize it. Again, alternatives are examined and their costs compared to their benefits in judging what is a workable way of minimizing each of these impacts.

Once you have answered each of the questions above, in as much detail as your time permits, address the following questions in your report:

21. Are there major effects that have not been adequately considered and met by the developer (and by any agencies responsible for approving this project, its land use, or its environmental precautions)?

22. If this is the case, what actions would you recommend to help ensure that the project's major environmental impacts are considered? Include constructive actions which you yourself can take as an individual or as part of an organization concerned with community and environmental improvement.

Project No. 3—Environmental Research

This project is particularly appropriate if your area includes a laboratory, test facility, or pilot project where research and development are under way on some new approach to environmental improvement. This could be a new technique for controlling air or water pollution, for recycling wastes, for protecting land or forests, for conserving natural resources or using them more efficiently—any area relating to a potential for a better environment.

Your report should describe in detail:

1. The full background of the problem this research work is designed to help meet.

2. The nature of this approach to the problem, its potential advantages and possible applications.

3. The present status of development.

4. Any technical obstacles that must be overcome.

5. Projected cost of using this approach, if it does prove successful. Discuss whether the cost may be an obstacle in getting it accepted for general use.

Summary

The study of local environmental problems through an independent or group study program provides an ideal opportunity for making education relevant to real-life situations. Every individual has a responsibility as a citizen to get involved in resolving the environmental issues affecting their destiny or well-being. We are all great exploiters of the earth's resources and must begin to look more thoroughly into the present and future consequences of our acts. Hopefully, by seeking information through research and formulating ideas, a new dimension and understanding about comprehensive planning and the complexity of solving environmental problems will be obtained. It is also hoped that the three projects suggested in this paper will help foster attitudes, values, and life styles which enhance the quality of life and the environment.

Suggested Readings

Alexander, William M., and Vynce A. Hines. Independent Study in Secondary Schools, New York: Holt, Rinehart and Winston, Inc., 1967, $5.25.

Atlanta Public Schools, Student Guide for Environmental Education Programs, Atlanta, Georgia, 1972, $1.00.

APPENDIX A: ENVIRONMENTAL CONCERNS

What do you feel are the most urgent environmental concerns? (Please rank the major categories by number in order of priority. Do the same for each of the elements within the categories.)

Major Categories

_____ Population Problems
_____ Transportation Problems
_____ Energy Problems
_____ Resource Depletion
_____ Natural Environment
_____ Aesthetics
_____ Materialism
_____ Planning, Design, and Construction Problems
_____ Economic-Social-Cultural Problems
_____ Knowledge Gaps
_____ Health Hazards
_____ Water Problems
_____ Land Use Problems
_____ Air Problems
_____ Others*

Elements Within Major Categories

Population Problems

_____ Distribution
_____ Growth rate
_____ Rural out-migration
_____ Drain on nonrenewable resources
_____ Others*

Transportation Problems

_____ Highway construction
_____ Lack of adequate mass transit systems
_____ Traffic congestion
_____ Others*

Energy Problems

_____ Fuel shortages
_____ Lack in development of alternate energy resources
_____ Lack of efficiency in use and production
_____ Others*

Environmental Concerns (continued)

Resource Depletion

_____ Lack of recycling for nonrenewable resources
_____ Improper management of renewable resources
_____ Others*

Natural Environment

_____ Endangered animal species
_____ Endangered plant species
_____ Loss of fishery and wildlife resources
_____ Loss of natural habitat
_____ Others*

Aesthetics

Distracting:

_____ Sights
_____ Sounds
_____ Smells
_____ Others*

Materialism

_____ Excessive waste in packaging
_____ Lack of durable, long-lasting goods
_____ Status products
_____ Consumerism (product knowledge)
_____ Others*

Planning, Design, and Construction Problems

_____ Aesthetically and functionally poor architectural design
_____ Lack of comprehensive regional planning
_____ Lack of environmental understanding and concern among planners, designers, and contractors
_____ Lack of planning to prevent future environmental problems and to solve current problems
_____ Inadequate and shoddy construction
_____ Others*

Economic-Social-Cultural Problems

_____ Apathy and lack of leadership in problem solving
_____ Failure of society to meet human psychological needs
_____ Harmful social and work environments

Environmental Concerns (continued)

Economic-Social-Cultural Problems (continued)

_____ Lack of adequate housing
_____ Lack of adequate job opportunities
_____ Life styles which are detrimental to environmental quality
_____ Loss of cultural identity and cultural shock
_____ Poverty
_____ Consumer problems (prices)
_____ Others*

Knowledge Gaps

_____ Lack of programs to find and promote solutions to environmental problems
_____ Lack of solutions to environmental problems
_____ Lack of understanding of environmental problems
_____ Others*

Health Hazards

_____ Air pollution
_____ Pesticides, herbicides, and toxic metals
_____ Food additives
_____ Noise
_____ Radiation
_____ Water pollution
_____ Others*

Water Problems

_____ Contamination of ground and surface waters by chemicals, dyes, etc.
_____ Flood control
_____ Lack of water use plans
_____ Limitation of fresh water supplies
_____ Sedimentation
_____ Thermal discharges
_____ Soft waste disposal
_____ Solid waste disposal
_____ Agricultural runoff (fertilizers, pesticides, and herbicides)
_____ Others*

Land Use Problems

_____ Erosion
_____ Inadequate zoning and planning
_____ Loss of parks, open space, wetlands, and natural areas
_____ Siting of facilities, e.g., nuclear power plants, power transformers and lines, etc.
_____ Loss of agricultural lands due to urbanization and inundation
_____ Mining operations

Environmental Concerns (continued)

Land Use Problems (continued)

_____ Solid waste disposal
_____ Visual blight (litter, billboards, etc.)
_____ Lack of land ethic
_____ Others*

Air Problems

Emissions:

_____ Trash burning, furnaces in homes
_____ Industrial and power plants
_____ Automobiles, trucks, buses, airplanes, motorcycles
_____ Others*

*Difficulties in citing the many concerns on this form cause the writer to urge you to provide any additional examples you might think of.

NOTE: This checklist or questionnaire should include (1) space for the respondent to state his or her name, profession, and address and (2) special directions for completing.

Please return completed questionnaire in the enclosed self-addressed, stamped envelope.

The Model Environmental Education Program

A model environmental education program is one which helps the individual become (1) aware of the environment and its associated problems; (2) concerned, knowledgeable, and accurately informed about the problems; (3) knowledgeable and informed about the possible future consequences of the problems; (4) engaged in clarifying values and making decisions based on attitudes and beliefs; (5) involved in finding the solutions to environmental problems–alternatives, tradeoffs, compromises, and costs; and (6) committed to and involved in some type of constructive action which enhances environmental quality.

–Jonathan M. Wert, Ph.D.